PORTABLE ELECTRONIC APPARATUS

BACKGROUND OF THE INVENTION

The present invention relates to a portable electronic apparatus such as a portable computer, a word processor, or the like in which image data is transmitted from a main body of the apparatus to a display device to display an image.

A portable electronic apparatus such as a portable computer comprises a computer body having a keyboard, and a display unit including a liquid crystal display device. The display unit is supported on the computer body by a hinge portion. By the rotation of the hinge portion, the display unit is rotatable between a close position in which the display unit covers the keyboard from upside and an open position in which the display unit stands behind the keyboard.

Conventionally, in this portable electronic apparatus, a control circuit in the computer body is connected with the liquid crystal display device of the display unit by means of a bundle of leads, and image data prepared in the control circuit of the computer body is transmitted as image signals to the liquid crystal display device of the display unit, through the bundle of leads. This bundle of leads is normally provided in the hinge section serving as a connecting portion for connecting the computer body and the display unit.

In addition, the control circuit in the computer body is connected with the liquid crystal display device in the display unit, by a flexible printed circuit (FPC), in place of the bundle of leads. This FPC is provided in the hinge portion.

However, according to the conventional structure as described above, since a bundle of leads for connecting the control circuit in the computer body with the liquid crystal display unit in the display unit is provided in the hinge portion which is moved when rotating the display unit between the close position and the open position, the bundle of leads is moved together with the hinge portion when rotating the display unit. Therefore, the bundle of leads receives a bending moment or a twisting moment due to rotation of the hinge portion, and are partially deflected or twisted so that the bundle of leads may be broken.

In particular, with the portable electronic apparatus such as a portable computer, the display unit is closed when carrying the computer, and is opened when using the computer. Thus, the number of times for which the display unit is opened and closed is increased, so that the bundle of leads is repeatedly applied with a load and the durability of the leads is deteriorated.

In recent years, the number of pixels of the liquid crystal display device of a display unit has been increased, so that liquid crystal display devices have come to be able to display a color image. Accordingly, the number of signals required for displaying an image has been greatly increased. Therefore, the number of leads for transmitting signals must be increased, resulting in that the diameter of a bundle of leads is increased. In contrast, the hinge portion has only a small space which can be shared for leads, and therefore, a bundle of leads cannot be arranged with sufficient margins. Hence, a problem has arisen in that the bundle of leads must be tightened so hard that the leads may be broken with high possibility.

Further, in the case where an FPC is used in place of a bundle of leads, the width of the FPC must be enlarged when the number of signals required for displaying an image is increased. A problem similar to the above occurs.

BRIEF SUMMARY OF THE INVENTION

The present invention has been made in view of the above situation, and its object is to provide a portable electronic apparatus in which transmission of signals between the main body and the display device of the apparatus in a cordless manner.

To achieve the above object, the portable electronic apparatus according to the present invention comprises: a first unit; a second unit rotatably connected with the first unit through a hinge portion; communication means for defining a communication path extending to be coaxial with a rotation center axis of the hinge portion and having one end communicating with an inner space of the first unit and another end communicating with an inner space of the second unit; transmission means provided in the first unit, for transmitting a data signal to the second unit through the communication path; and receiver means for receiving the data signal from the transmission means, provided in the second unit such that the receiver mean faces the transmission means through the communication path.

According to the present invention, the transmission means has a light emission element for emitting an optical signal, provided so as to face the end of the communication path, and the receiver means has a light receive element for receiving the optical signal, provided so as to face the other end of the communication path.

According to the portable electronic apparatus constructed in a structure as described above, a data signal is transmitted from the transmission means or the light emission element and is received by the receiver means or the light receive element through a communication path, when a data signal is sent from the first unit to the second unit. The data signal thus received is further supplied to the second unit. In this manner, no wirings need not be provided between the first and second units, so that transmission and receipt of signals can be realized in a cordless manner.

Further, the portable electronic apparatus according to another aspect of the present invention comprises: an apparatus body; a display device rotatably connected with the apparatus body through a hinge portion, and including display means for displaying an image; communication means for defining a communication path extending to be coaxial with a rotation center axis of the hinge portion and having one end communicating with an inner space of the apparatus body and another end communicating with an inner space of the display device; transmission means provided in the apparatus body, for transmitting image data to be displayed by the display device, in form of an image signal; and receiver means for receiving the image signal from the transmission means, provided in the display device such that the receiver mean faces the transmission means through the communication path.

According to the present invention, the transmission means has a light emission element for emitting an optical signal, provided to be engaged in the end of the communication path and to be coaxial with the rotation center axis, and circuit means for supplying the image data to the light emission element, provided in the apparatus body. The receiver means has a light receive element for receiving the optical signal, provided to be engaged in the other end of the communication path and to be coaxial with the rotation center axis, and conversion circuit means provided in the display device, for converting the optical signal received by the light receive means, into the image signal, and for supplying the image signal to the display means.

According to the portable electronic apparatus constructed in a structure as described above, an image signal is transmitted from the transmission means or the light emission element and the image signal is received by the receiver